CLAIMS

What is claimed is:

1. A computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer causes the computer to:

acquire a B_1 field map for each transmit coil of a transmit coil array;

determine from the B_1 field maps a spatiotemporal variation of a composite B_1 field; and

generate an RF pulsing sequence tailored to a respective transmit coil such that RF power deposition during MR imaging is reduced.

2. The computer readable storage medium of claim 1 wherein the set of instructions further causes the computer to minimize RF power deposition across an imaging volume without causing substantial deviation of a RF excitation profile created by the transmit coil array from a desired excitation profile.

3. The computer readable storage medium of claim 1 wherein the set of instructions causes the computer to minimize RF power deposition and embodies a principle that is applicable to any transmit coil array geometry.

4. The computer readable storage medium of claim 1 wherein the set of instructions causes the computer to determine an RF pulse scheme for a transmit coil based on at least an effective B_1 field for the transmit coils.

5. The computer readable storage medium of claim 4 wherein each effective B_1 field reflects mutual coupling of a transmit coil and at least another transmit coil.

6. The computer readable storage medium of claim 1 wherein the set of instructions further causes the computer to design each pulsing sequence such that parallel RF excitation with the transmit coil array produces a result that is consistent with a desired excitation profile.

7. The computer readable storage medium of claim 1 wherein the set of instructions further causes the computer to acquire 2D or 3D MR data.

8. The computer readable storage medium of claim 1 wherein the transmit coil array includes a linearly arranged plurality of transmit coils.

9. The computer readable storage medium of claim 8 wherein each transmit coil is driven by a dedicated RF amplifier.

10. An MRI apparatus comprising:

a magnetic resonance imaging (MRI) system having a magnet to impress a polarizing magnetic field, a plurality of gradient coils positioned about a bore of the magnet to induce a magnetic field gradient, a transmit coil array having a plurality of transmit coils, and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and

a computer programmed to regulate RF power deposition on a subject during MR imaging through independent control of the plurality of transmit coils.

11. The MRI apparatus of claim 10 wherein the computer is further programmed to simultaneously achieve RF excitation consistent with a desired excitation profile and SAR reduction on the subject.

12. The MRI apparatus of claim 10 wherein the computer is further programmed to control RF excitation of the transmit coil array to focus RF excitation on a region-of-interest within the subject.

13. The MRI apparatus of claim 10 wherein the computer is further programmed to design an RF pulse waveform for a transmit coil based on at least an effective B_1 field generated by the transmit coil.

14. The MRI apparatus of claim 10 wherein the computer is further programmed to acquire 2D or 3D MR data.

15. The MRI apparatus of claim 10 wherein the plurality of transmit coils of the transmit coil array is linearly arranged.

16. The MRI apparatus of claim 10 wherein each transmit coil is driven by a dedicated RF amplifier.

17. The MRI apparatus of claim 10 wherein the computer is further programmed to design an RF pulse waveform for each transmit coil such that side lobes in a parallel RF excitation by the transmit coil array are reduced.

18. A method of MR imaging comprising the steps of:

determining a region-of-interest in an imaging volume; and

independently controlling RF excitation by a plurality of transmit coils of a transmit coil array such that RF power deposition is reduced.

19. The method of claim 18 further comprising the step of independently controlling RF excitation by the plurality of transmit coils such that RF power absorption

by a subject disposed in the imaging volume is minimized on average over the imaging volume.

20. The method of claim 19 further comprising the step of minimizing RF power deposition over the imaging volume without causing substantial deviation of a parallel RF excitation profile created by the transmit coil array from a desired excitation profile.

21. The method of claim 18 further comprising the step of minimizing RF power deposition, which embodies a principle that is applicable to any transmit coil array geometry.

22. The method of claim 18 further comprising the step of determining an RF pulse scheme for each transmit coil based on at least an effective B_1 field for each transmit coil.

23. The method of claim 22 wherein each effective B_1 field includes data regarding mutual coupling of the plurality of transmit coils.